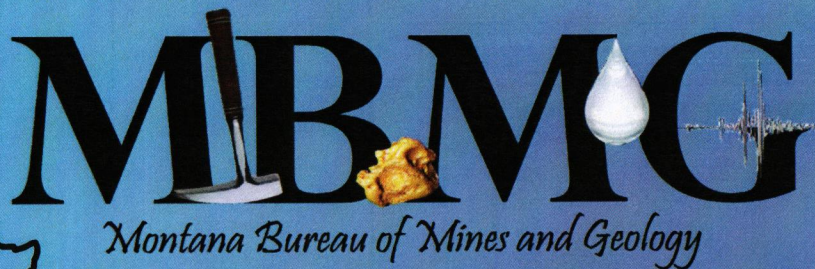


Surface Water Assessment and Monitoring Program "SWAMP"



Water Policy Interim Committee
July 11, 2016
John Metesh and Tim Davis
MBMG and DNRC

WATER POLICY INTERIM
COMMITTEE 2015-16

July 11, 2016

Exhibit 6

Origin of SWAMP

MBMG:

GWAP

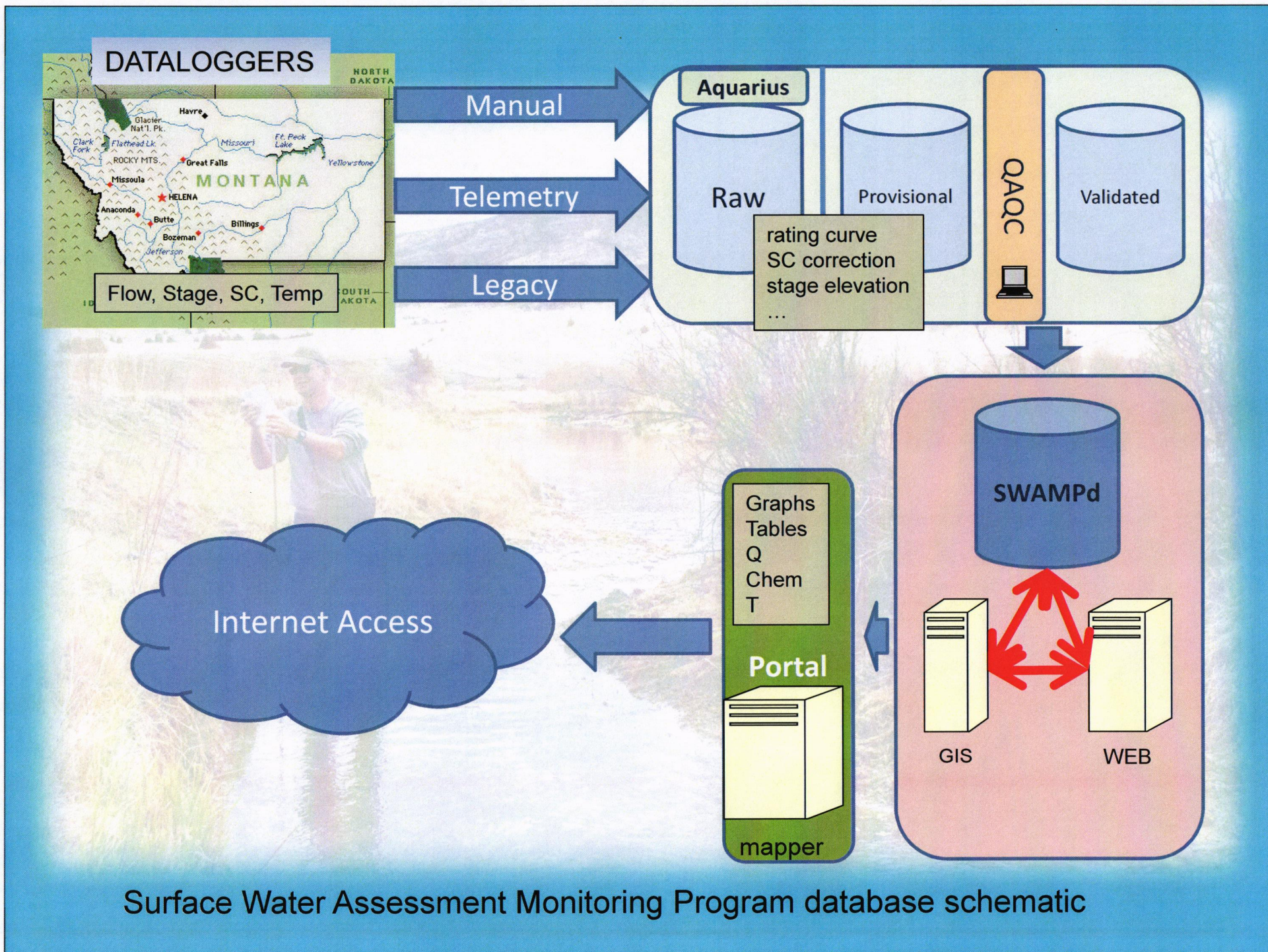
- recognized long-term data needs,
- established the state wide monitoring of groundwater (why not surface water?),
- the need to deliver data to public – **GWIC** online database
 - flow/water levels, site information, and chemistry
 - Co-located with geology, mines, coal...any other data we collect

GWIP

- ground water - surface water interaction studies generate several years of coupled data
 - for example, revived gage sites in Gallatin and Bitterroot Valleys (in cooperation with DNRC and USGS)
- Collected seepage runs etc on irrigation canals

DNRC:

- long history of collecting surface water data statewide
- saw need for real time data - waiting for technology to get cheap
- and, of course, waiting for an excellent cooperator



Surface Water Assessment Monitoring Program database schematic

Historic (legacy) data

- Both DNRC and MBMG have long history of collecting surface water data for various studies
 - Shorter-term records captures weather...land-use change...
 - Long-term records are used to evaluate climate...cumulative impacts...

Note

Peak flow estimates require 10+ years

CSKT relied on 30+ years of data – typical for fisheries studies

Other data collectors

- CSKT: planned Aquarius web portal (not real time for SWAMP)
 - Legacy data?
- USGS: is real time, we provide a link to their sites within
- DEQ...Blue Water...: legacy or current, but no real-time planned

neither MBMG nor DNRC collects data
data quality is identified with agency



Montana Bureau of Mines and Geology
Science and Service

Tuesday, February 09, 2016



Quick Links

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[ArcGIS Web Services](#) | [Geologic Mapping Program](#) | [MBMG Data Center](#) | [MBMG Location Map](#) | [Build a Volcano](#)

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Hot Topics

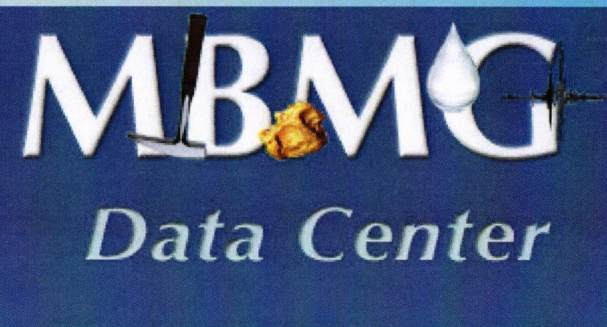
Established in 1919, the Montana Bureau of Mines and Geology (MBMG) continues to fulfill its mandate to collect and publish information on Montana's geology to promote orderly and responsible development of the energy, groundwater, and mineral resources of the State. A non-regulatory state agency, the MBMG provides extensive advisory, technical, and informational services on the State's geologic, mineral, energy, and water resources. The MBMG is increasingly involved in studies of the environmental impacts to land and water caused either by past practices in hard-rock mining or by current activities in agriculture and industry.

MBMG people and projects in the news!

The MBMG's **2016 Screensaver** is now available for your enjoyment!



mbmg.mtech.edu



MBMG

Data Center

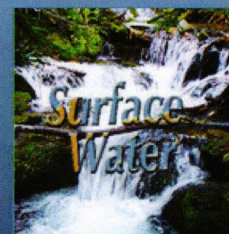
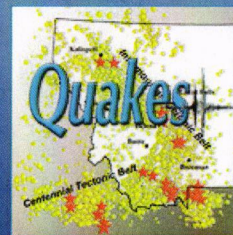
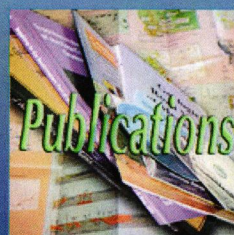
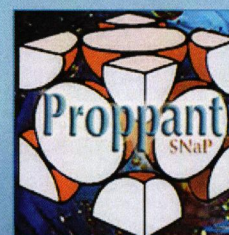
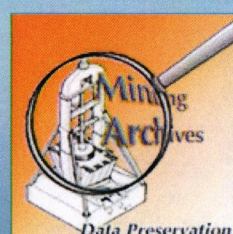
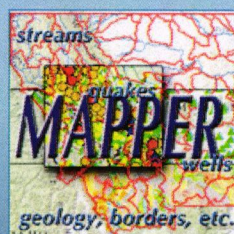
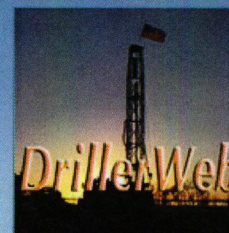
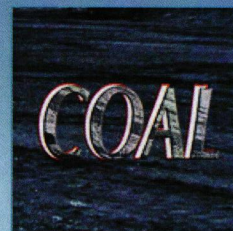
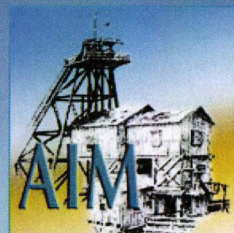
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Click on the icons for databases.



For more information contact:

- Luke Buckley
406.496.4677
email LBuckley
- or
- Bulbul Majumder
406.496.4894 or
email BMajumder

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Data Center

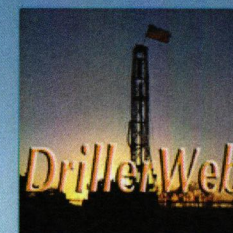
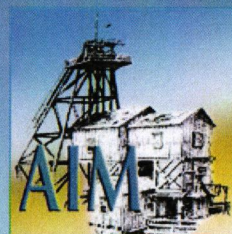
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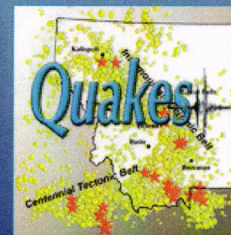
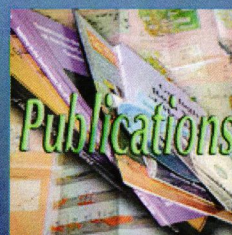
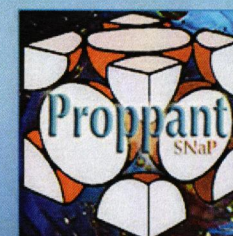
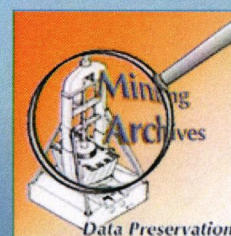
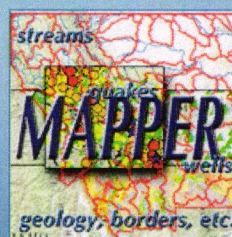
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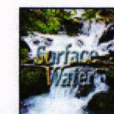
For more information contact:

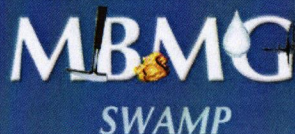
- Luke Buckley
406.496.4677
email LBuckley
or
- Bulbul Majumder
406.496.4894 or
email BMajumder



Surface Water Program/SWAMP

Data collected in support of the Surface Water Assessment and Monitoring Program. Data included from DNRC, MBMG, and USGS resources.

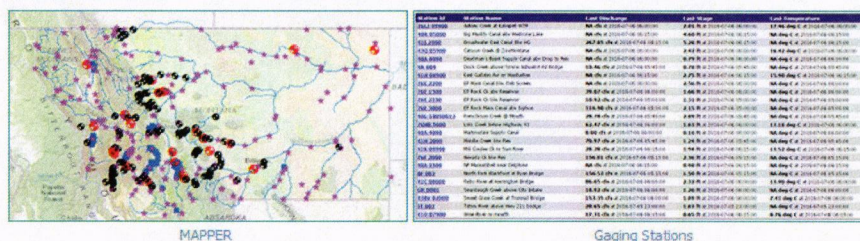




Wednesday, July 06, 2016



Surface Water Assessment and Monitoring Program



The Surface Water Assessment and Monitoring Program (SWAMP) is a joint program initiated by the Department of Natural Resources and Conservation (DNRC) and the Montana Bureau of Mines and Geology (MBMG) to collect real-time stream-flow data and conduct watershed assessments to aid decision making and policy development in Montana. While data collection, compilation, and dissemination are critical in the short term, these data provide important information to support watershed studies aimed at constructing predictive models of surface-water and groundwater resources subject to development and climate change. Watershed studies conducted under this program will provide opportunities for applied research and training for students of the Montana University System.

The gaging component of the Surface Water Assessment and Monitoring Program (SWAMP) is a cooperative effort between state agencies in Montana to capture, store, and deliver information about surface water resources. It is designed to focus on the smaller watersheds where existing data is either scarce or non-existent. This focus is intended to complement the work already done by the United States Geological Survey (USGS) and their stream gaging efforts on the major rivers.

The information is needed by a wide range of consumers including but not limited to: Water Commissioners, water right holders, reservoir operators, irrigation districts, recreationalists, local watershed groups and conservation districts (drought management planning), MBMG (groundwater studies), Department of Fish, Wildlife and Parks (instream flows), and the Department of Environmental Quality (water quality monitoring), Department of Transportation, and other State and Federal agencies.

The watershed assessment component of SWAMP is a systematic program for characterizing surface water hydrology in smaller watersheds. Long-term monitoring will supplement watershed characterization and assessment providing data for climate change impact analysis, watershed modeling, basin sedimentation studies, TMDL, and other direct applications to watershed management. In turn, the long-term monitoring effort will be based on the aforementioned assessment for site selection, parameter (chemistry, sediment, temperature, etc.) selection, and data collection frequency.

The DNRC is responsible for installation, operation, and maintenance of the stream gages. Once the gages are installed and operational, the data are sent via satellite (real-time) to the DNRC headquarters in Helena for reduction and development of rating curves.

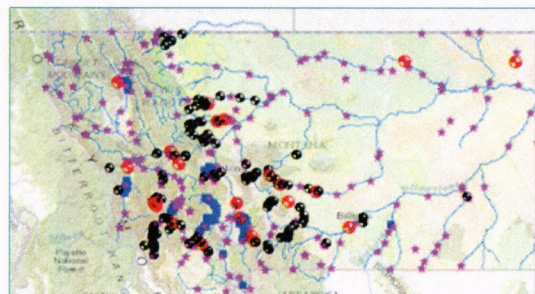
The MBMG is responsible for building and maintaining the publicly accessible databases and web applications as an extension of their existing Data Center. Data are harvested from DNRC on an hourly

MBMG

SWAMP



- ## Surface Water Assessment and Monitoring Program



MAPPER

[illegible]

Gaging Stations

The Surface Water Assessment and Monitoring Program (SWAMP) is a joint program initiated by the Department of Natural Resources and Conservation (DNRC) and the Montana Bureau of Mines and Geology (MBMG) to collect real-time stream-flow data and conduct watershed assessments to aid decision making and policy development in Montana. While data collection, compilation, and dissemination are critical in the short term, these data provide important information to support watershed studies aimed at constructing predictive models of surface-water and groundwater resources subject to development and climate change. Watershed studies conducted under this program will provide opportunities for applied research and training for students of the Montana University System.



Surface Water Assessment and Monitoring Program - Station List

The following lists include the stream gages that are currently available in the Surface Water Assessment and Monitoring Program (SWAMP) database. The top section of the page lists the gages that are sending data continuously via satellite. The bottom section lists the gages that have been that are either currently monitored and downloaded manually or have been monitored at some time in the past.

Real-Time Gaging Station Details

Station Id	Station Name	Last Discharge	Last Stage	Last Temperature
76LJ 09900	Ashley Creek at Kalispell WTP	NA cfs at 2016-07-05 11:00:00	2.03 ft at 2016-07-05 11:00:00	18.19 deg C at 2016-07-05 11:00:00
40R 05000	Big Muddy Canal abv Medicine Lake	NA cfs at 2016-07-05 11:15:00	4.67 ft at 2016-07-05 11:15:00	NA deg C at 2016-07-05 11:15:00
41I 2000	Broadwater East Canal Blw HG	238.80 cfs at 2016-07-05 11:15:00	4.92 ft at 2016-07-05 11:15:00	NA deg C at 2016-07-05 11:15:00
43Q 05900	Canyon Creek @ ZooMontana	NA cfs at 2016-07-05 11:00:00	2.54 ft at 2016-07-05 11:00:00	17.64 deg C at 2016-07-05 11:00:00
40A 8080	Deadman's Basin Supply Canal abv Drop to Res	NA cfs at 2016-07-05 11:00:00	0.84 ft at 2016-07-05 11:00:00	NA deg C at 2016-07-05 11:00:00
SR 004	Duck Creek above Simms Ashuelot Rd Bridge	22.50 cfs at 2016-07-05 10:45:00	1.19 ft at 2016-07-05 10:45:00	NA deg C at 2016-07-05 10:45:00
41H 08900	East Gallatin Rvr nr Manhattan	NA cfs at 2016-07-05 11:15:00	2.78 ft at 2016-07-05 11:15:00	19.09 deg C at 2016-07-05 11:15:00
76E 2200	EF Main Canal blw Fish Screen	NA cfs at 2016-07-05 11:00:00	2.59 ft at 2016-07-05 11:00:00	NA deg C at 2016-07-05 11:00:00
76E 1500	EF Rock Ck abv Reservoir	43.61 cfs at 2016-07-05 11:00:00	1.71 ft at 2016-07-05 11:00:00	NA deg C at 2016-07-05 11:00:00
76E 2100	EF Rock Ck blw Reservoir	10.60 cfs at 2016-07-05 10:00:00	1.30 ft at 2016-07-05 10:00:00	NA deg C at 2016-07-05 10:00:00
76E 3000	EF Rock Main Canal abv Siphon	118.25 cfs at 2016-07-05 10:00:00	2.16 ft at 2016-07-05 10:00:00	NA deg C at 2016-07-05 10:00:00
40L-10050013	Frenchman Creek @ Mouth	27.72 cfs at 2016-07-05 10:45:00	2.87 ft at 2016-07-05 10:45:00	NA deg C at 2016-07-05 10:45:00
76HB 9600	Lolo Creek below Highway 93	68.86 cfs at 2016-07-05 11:00:00	1.87 ft at 2016-07-05 11:00:00	13.32 deg C at 2016-07-05 11:00:00
40A 4080	Martinsdale Supply Canal	0.00 cfs at 2016-07-05 11:00:00	0.16 ft at 2016-07-05 11:00:00	NA deg C at 2016-07-05 11:00:00
41H 2000	Middle Creek blw Res	61.43 cfs at 2016-07-05 10:45:00	1.18 ft at 2016-07-05 10:45:00	NA deg C at 2016-07-05 10:45:00
41K 09900	Mill Coulee Ck nr Sun River	30.95 cfs at 2016-07-05 11:15:00	1.99 ft at 2016-07-05 11:15:00	13.77 deg C at 2016-07-05 11:15:00
76F 2000	Nevada Ck blw Res	157.80 cfs at 2016-07-05 10:15:00	2.37 ft at 2016-07-05 10:15:00	NA deg C at 2016-07-05 10:15:00
40A 1500	NF Musselshell near Delphine	NA cfs at 2016-07-05 11:15:00	0.99 ft at 2016-07-05 11:15:00	NA deg C at 2016-07-05 11:15:00
BF 003	North Fork Blackfoot at Ryan Bridge	160.86 cfs at 2016-07-05 10:15:00	1.52 ft at 2016-07-05 10:15:00	NA deg C at 2016-07-05 10:15:00
41C 08000	Ruby River at Harrington Bridge	105.99 cfs at 2016-07-05 11:00:00	2.41 ft at 2016-07-05 11:00:00	16.33 deg C at 2016-07-05 11:00:00
GR 0001	Sourdough Creek above City Intake	20.64 cfs at 2016-07-05 11:00:00	1.27 ft at 2016-07-05 11:00:00	NA deg C at 2016-07-05 11:00:00
43BV 02000	Sweet Grass Creek at Tronrud Bridge	162.61 cfs at 2016-07-05 11:00:00	1.93 ft at 2016-07-05 11:00:00	10.73 deg C at 2016-07-05 11:00:00
TT 003	Teton River above Hwy 221 bridge	20.65 cfs at 2016-07-05 11:00:00	1.83 ft at 2016-07-05 11:00:00	NA deg C at 2016-07-05 11:00:00
41D 07900	Wise River nr mouth	17.93 cfs at 2016-07-05 11:15:00	0.66 ft at 2016-07-05 11:15:00	11.99 deg C at 2016-07-05 11:15:00

24 record(s) listed.

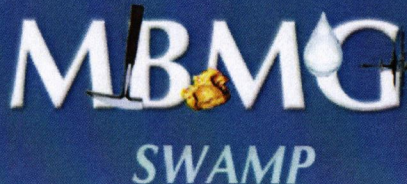
41J 109500	Smith River above Sheep Creek near Camp Baker	46.00 cfs at 2001-10-16 08:00:00	1.02 ft at 2001-10-16 08:00:00	NA deg C at 2001-10-16 08:00:00
41J 09000	Smith River at Buckingham's	29.38 cfs at 2001-10-17 00:00:00	0.85 ft at 2001-10-17 00:00:00	NA deg C at 2001-10-17 00:00:00
41J 05000	Smith River at Hanson's below Forks	14.50 cfs at 2001-10-17 12:45:00	4.16 ft at 2001-10-17 12:45:00	NA deg C at 2001-10-17 12:45:00
DB 004	South Fork Dearborn	2.00 cfs at 2010-10-01 00:00:00	NA ft at 2010-10-01 00:00:00	NA deg C at 2010-10-01 00:00:00
40F 01800	South Fork of Milk River at Johnston Ranch	21.09 cfs at 2009-10-20 14:39:56	0.50 ft at 2009-10-20 14:39:56	5.38 deg C at 2009-10-20 14:39:56
41I 04010	Spokane Creek below Keir Lane Bridge	3.07 cfs at 2016-02-08 16:10:00	1.49 ft at 2016-02-08 16:10:00	NA deg C at 2016-02-08 16:10:00
41D 06850	Steel Cr nr Hwy 43	4.22 cfs at 2015-10-22 10:32:11	0.68 ft at 2015-10-22 10:32:11	NA deg C at 2015-10-22 10:32:11
41D 06870	Steel Creek at Forest Bndy	41.03 cfs at 2014-06-12 08:59:09	NA ft at 2014-06-12 08:59:09	NA deg C at 2014-06-12 08:59:09
SR 005	Sun River below Elk Creek	241.80 cfs at 2016-05-18 11:21:38	4.14 ft at 2016-05-18 11:21:38	9.53 deg C at 2016-05-18 11:21:38
41D 07200	Swamp Cr at NF Rd	15.23 cfs at 2015-10-27 11:29:45	1.98 ft at 2015-10-27 11:29:45	NA deg C at 2015-10-27 11:29:45
43BV 08000	Sweet Grass Creek at Agnew's	68.90 cfs at 2011-12-29 00:00:00	1.84 ft at 2011-12-29 00:00:00	NA deg C at 2011-12-29 00:00:00
43BV 04000	Sweet Grass Creek at Otter Creek Bridge	16.68 cfs at 2015-10-29 00:00:00	NA ft at 2015-10-29 00:00:00	NA deg C at 2015-10-29 00:00:00
43BV 07000	Sweet Grass Creek at Rapalje Bridge	60.02 cfs at 2008-10-15 00:00:00	NA ft at 2008-10-15 00:00:00	NA deg C at 2008-10-15 00:00:00
43BV 09000	Sweet Grass Creek at Vermillion Bridge	42.98 cfs at 2015-10-28 15:32:12	1.58 ft at 2015-10-28 15:32:12	NA deg C at 2015-10-28 15:32:12
43BV 05000	Sweet Grass Creek Below Glasston Intake	35.48 cfs at 2015-10-28 12:21:37	0.92 ft at 2015-10-28 12:21:37	5.56 deg C at 2015-10-28 12:21:37
42C 10000	T&Y Canal below headgate near Miles City, MT	NA cfs at 2015-07-07 17:45:00	2.28 ft at 2015-07-07 17:45:00	NA deg C at 2015-07-07 17:45:00
41I 06060	Tenmile Creek at Treatment Plant Bridge	98.20 cfs at 2016-04-26 10:05:00	1.41 ft at 2016-04-26 10:05:00	NA deg C at 2016-04-26 10:05:00
TT 009	Teton River below Bootlegger Bridge	0.86 cfs at 2012-11-07 14:45:00	0.82 ft at 2012-11-07 14:45:00	NA deg C at 2012-11-07 14:45:00
TT 008	Teton River below Buck Bridge	28.64 cfs at 2012-11-07 15:28:26	2.51 ft at 2012-11-07 15:28:26	NA deg C at 2012-11-07 15:28:26
TT 002	Teton River below Hwy 287 Bridge (State Section)	24.96 cfs at 2016-05-23 11:19:05	1.71 ft at 2016-05-23 11:19:05	NA deg C at 2016-05-23 11:19:05
76GJ 5000	Trout Ck blw Marshall Diversion			
40A 7000	Two Dot Canal	0.00 cfs at 2014-10-09 10:38:52	-1.00 ft at 2014-10-09 10:38:52	NA deg C at 2014-10-09 10:38:52
DB 001	Upper Dearborn River	NA cfs at 2010-10-20 10:30:00	0.38 ft at 2010-10-20 10:30:00	NA deg C at 2010-10-20 10:30:00
TT 011	Upper Deep Creek above Deep Creek Road	NA cfs at 2012-11-14 14:04:57	1.71 ft at 2012-11-14 14:04:57	NA deg C at 2012-11-14 14:04:57
SR 001	Upper Elk Creek at FS Boundary	45.21 cfs at 2016-05-18 08:31:10	1.20 ft at 2016-05-18 08:31:10	1.75 deg C at 2016-05-18 08:31:10
SR 006	Upper Mill Coulee	28.85 cfs at 2013-08-22 13:00:00	1.99 ft at 2013-08-22 13:00:00	NA deg C at 2013-08-22 13:00:00
TT 004	Upper Spring Creek (Barhaugh)	3.60 cfs at 2016-06-27 11:30:00	0.90 ft at 2016-06-27 11:30:00	NA deg C at 2016-06-27 11:30:00
43BJ 07800	West Boulder River at McLeod	80.60 cfs at 2006-10-24 13:15:00	0.64 ft at 2006-10-24 13:15:00	NA deg C at 2006-10-24 13:15:00
43BJ 07200	West Boulder River at Range Station at Forest Boun	67.60 cfs at 2007-10-29 11:46:00	0.29 ft at 2007-10-29 11:46:00	NA deg C at 2007-10-29 11:46:00
41H 1500	WF Hyalite Ck	19.44 cfs at 2014-10-06 10:30:00	1.26 ft at 2014-10-06 10:30:00	NA deg C at 2014-10-06 10:30:00
TT 012	Willow Creek	0.26 cfs at 2012-11-14 12:45:00	0.84 ft at 2012-11-14 12:45:00	NA deg C at 2012-11-14 12:45:00
41D 07870	Wise River above Upper PKR Ditch headgate	29.47 cfs at 2014-08-28 00:00:00	3.99 ft at 2014-08-28 00:00:00	NA deg C at 2014-08-28 00:00:00
41D 07850	Wise River below Pattengail Creek confluence	520.00 cfs at 2016-05-13 10:00:00	2.08 ft at 2016-05-13 10:00:00	NA deg C at 2016-05-13 10:00:00

133 record(s) listed.

Disclaimer:

The preceding materials represent the contents of the Surface Water Assessment and Monitoring Program (SWAMP) databases at the Montana Bureau of Mines and Geology at the time and date of the retrieval. The information is considered unpublished and is subject to correction and review on a daily basis. The Bureau warrants the accurate transmission of the data to the original end user at the time and date of the retrieval [7/5/2016 1:37:41 PM]. Retransmission of the data to other users is discouraged and the Bureau claims no responsibility if the material is retransmitted. There may be data in the request area that are not recorded at the Bureau's Data Center.

"harvested" every hour – updates are automatic, including new sites



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- ▶ ENVIRONMENTAL STUDIES
- ▶ EXPLORING EARTH SCIENCES WITH KIDS
- ▶ GIS — GEOGRAPHIC INFORMATION SYSTEMS
- ▶ GEOLOGIC RESEARCH/MAPPING
- ▶ GROUNDWATER
- ▶ GWAP — MONTANA GROUND WATER ASSESSMENT PROGRAM
- ▶ GWIP — GROUND WATER INVESTIGATION PROGRAM
- ▶ MINERAL MUSEUM
- ▶ MINING ARCHIVES
- ▶ PUBLICATIONS/INFORMATION SERVICES
- ▶ SWAMP — SURFACE WATER ASSESSMENT

MAPPER

[illegible]

Gaging Stations

The Surface Water Assessment and Monitoring Program (SWAMP) is a joint program initiated by the Department of Natural Resources and Conservation (DNRC) and the Montana Bureau of Mines and Geology (MBMG) to collect real-time stream-flow data and conduct watershed assessments to aid decision making and policy development in Montana. While data collection, compilation, and dissemination are critical in the short term, these data provide important information to support watershed studies aimed at constructing predictive models of surface-water and groundwater resources subject to development and climate change. Watershed studies conducted under this program will provide opportunities for applied research and training for students of the Montana University System.

[View Gage List](#)

Layers

Basemap Layers Basemaps

Current Basemap: Topographic

Map Layers

- ☒ DNRC Gaging Stations
- ☒ USGS Gaging Stations
- ☒ MBMG Surface Water Monitoring
- ☒ MBMG Groundwater Monitoring
- ☒ HUC Boundary
- ☒ Streams

Legend/Tools

Geology: The geology portrayed in the mapper is the 1:500,000 scale geologic geodatabase maintained by the MBMG. Click [here](#) to download a free copy of GM 62D, an information booklet that explains formation names and codes portrayed in the mapper. Note: The geologic map was originally drawn to match different base maps than those currently served on the MBMG mappers. Therefore disagreements between the geologic map and landforms will become apparent at scales larger than 1:500,000.

Geology Transparency

DNRC Gaging Stations

- Gaging station
- Real time station

USGS Gaging Stations

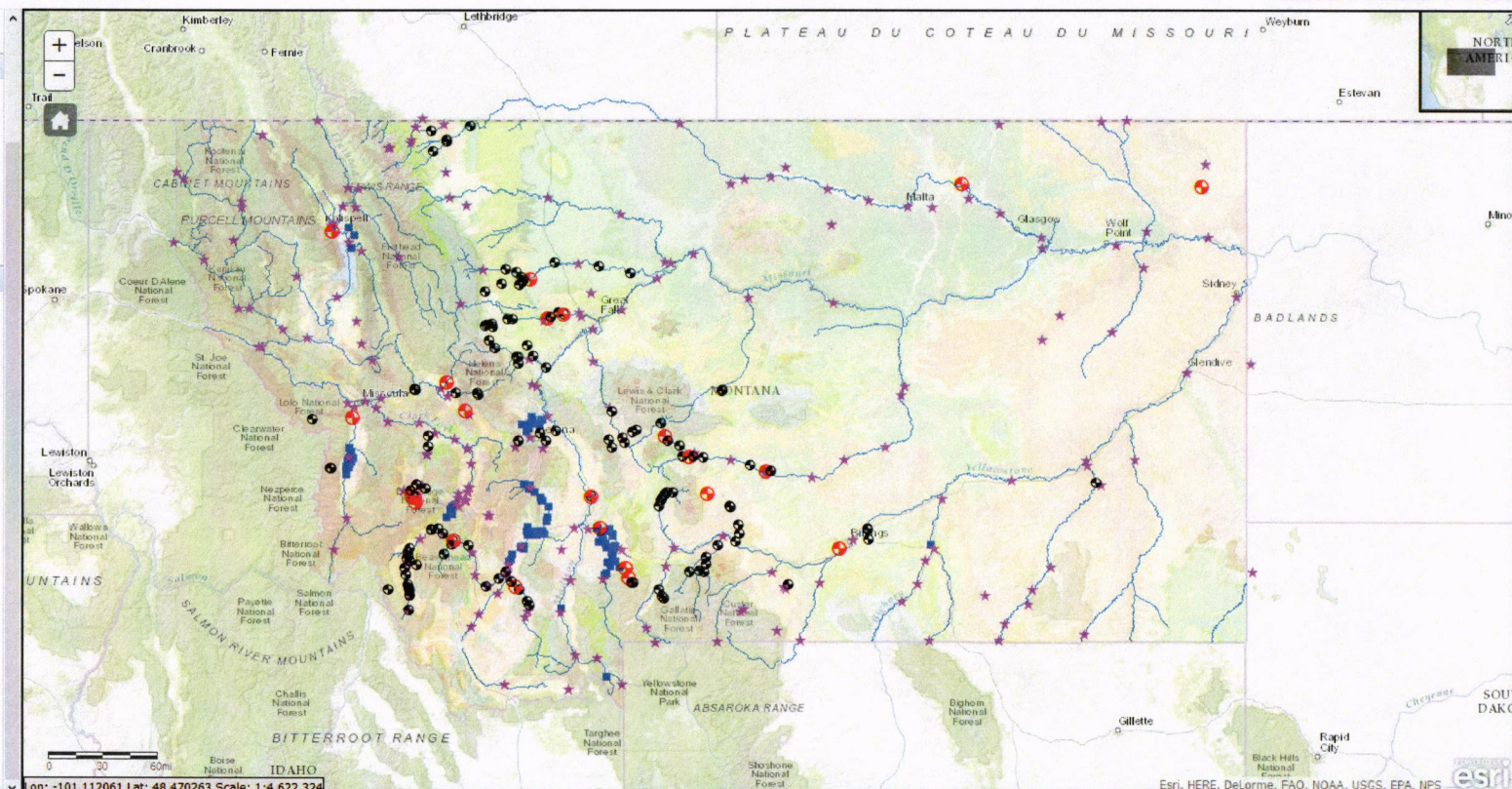
*

MBMG Surface Water Monitoring

■

Streams

Streams



[View Gage List](#)

Layers

Basemap Layers **Basemaps**

Current Basemap: Topographic

Map Layers



- ☒ DNRC Gaging Stations
- ☒ USGS Gaging Stations
- ☒ MBMG Surface Water Monitoring
- ☐ MBMG Groundwater Monitoring
- ☐ HUC Boundary
- ☒ Streams

Legend/Tools

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Geology Transparency

DNRC Gaging Stations

-  Gaging station
-  Real time station

USGS Gaging Stations

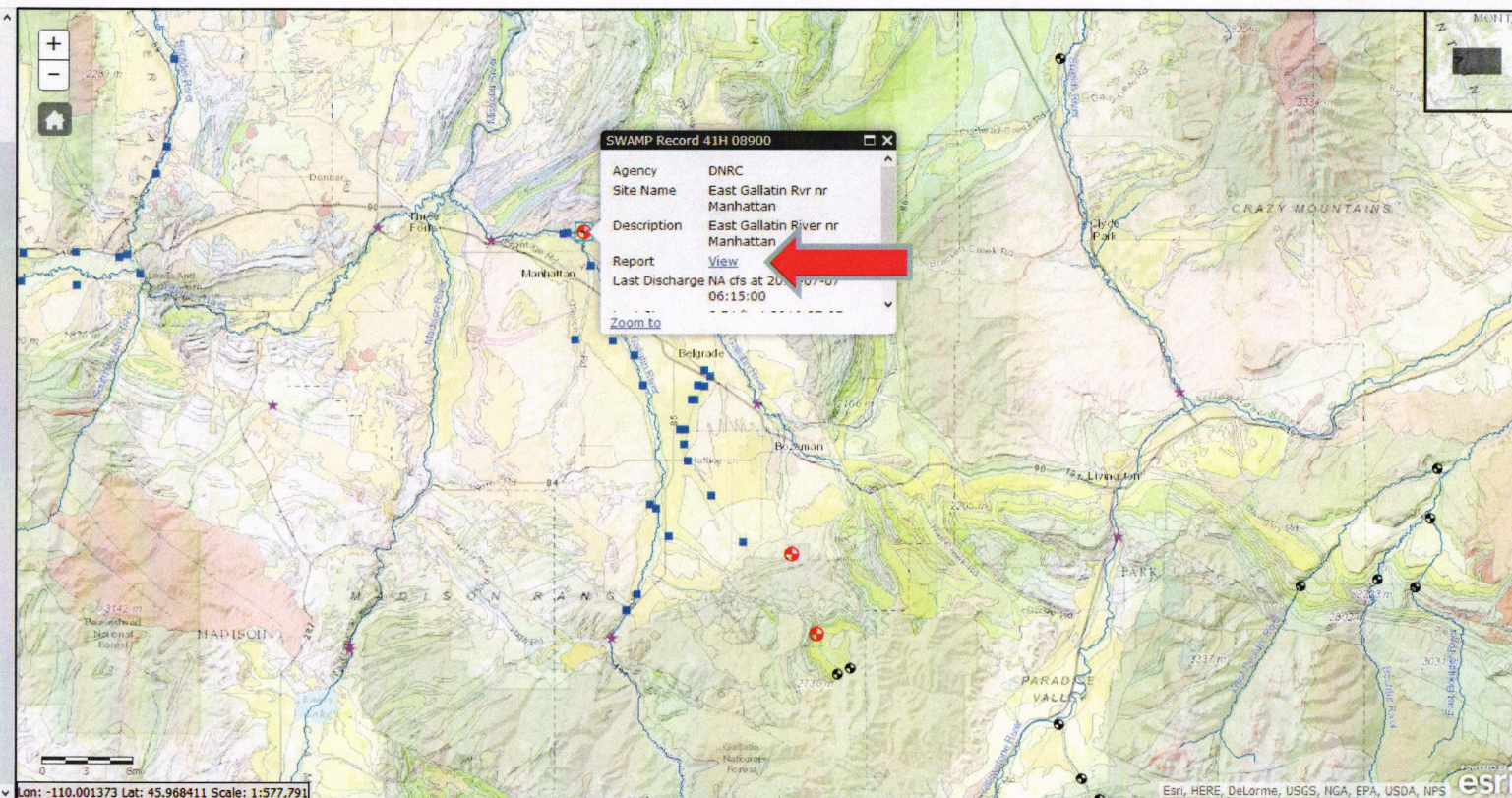


MBMG Surface Water Monitoring



Streams

Streams





MBMG
Montana Bureau of Mines and Geology

DNRC
The Montana Department of
Natural Resources
& Conservation

Sourdough Creek above City Intake (ID: GR 0001)

The following data are available from the Surface Water Assessment and Monitoring Program (SWAMP) database. Data from the stations are collected by the Department of Natural Resources and Conservation (DNRC) and transmitted hourly to the Montana Bureau of Mines and Geology (MBMG). Station details are listed followed by summary data in the left-hand column and data download options and charts in the right-hand column.

Collecting Agency	Site Type	Location (Lon/Lat)	Location (TRSQ)	County
Department of Natural Resources & Conservation	Hydrology Station	-111.020416, 45.579082 (SRID: 4326)	03506E17BCB	GALLATIN

[View Gage List](#) | [Mapper](#)

Most Recent Automated Reading

Discharge Graph

Discharge: **18.92 cfs** at 2016-07-07 07:00:00

Stage: **1.26 ft** at 2016-07-07 07:00:00

Temperature: **NA deg C** at 2016-07-07 07:00:00

* New data is available every hour at 00:00.

Site Summary Min/Avg/Max

Month	Discharge (cfs)			Stage (ft)			Temp (deg F)
	Min	Avg	Max	Min	Avg	Max	
March	5.43	9.43	23.80	1.04	1.10	1.20	
April	8.75	31.63	60.11	1.09	1.41	1.71	
May	31.71	51.20	73.31	1.4	1.63	1.82	
June	19.72	31.97	45.98	1.27	1.42	1.58	
July	13.31	18.64	37.24	1.21	1.26	1.48	
August	5.70	11.26	20.03	1.14	1.19	1.28	
September	4.47	9.08	22.76	1.13	1.17	1.31	
October	0.00	9.29	22.76	1.14	1.17	1.31	
November	0.00	16.79	67.40	1.08	1.26	1.66	
December				-889.86	0.69	1.93	

* The data displayed above were compiled from the SWAMP database at the time this report was generated.

Other MBMG Data Center Resources

Ground Water Information Center (GWIC)

81 record(s) are available in the GWIC database.

- There are 5 static water level measurement(s).
- There are 1 water quality sample(s).
- There are 3 field visit record(s).
- There are 0 aquifer test record(s).

MBMG Publications Catalog

350 record(s) are available in the Publications catalog for GALLATIN county.

Mining Archives

2 record(s) are available in the Mining Archives database.

* The data displayed above were compiled from the SWAMP database at the time this report was generated.

Other MBMG Data Center Resources

Ground Water Information Center (GWIC)

81 record(s) are available in the GWIC database.

- There are 5 static water level measurement(s).
- There are 1 water quality sample(s).
- There are 9 field visit record(s).
- There are 0 aquifer test record(s).

MBMG Publications Catalog

350 record(s) are available in the Publications catalog for GALLATIN county.

Mining Archives

2 record(s) are available in the Mining Archives database.

Abandoned & Inactive Mines (AIM)

2 record(s) are available in the AIM database.

Coal

There are 0 records available in the COAL database.

* Other resources are retrieved based on data available with Township/Range, County, or Latitude/Longitude values.



Sourdough Creek above City Intake (ID: GR 0001)

The following data are available from the Surface Water Assessment and Monitoring Program (SWAMP) database. Data from the stations are collected by the Department of Natural Resources and Conservation (DNRC) and transmitted hourly to the Montana Bureau of Mines and Geology (MBMG). Station details are listed followed by summary data in the left-hand column and data download options and charts in the right-hand column.

Collecting Agency	Site Type	Location (Lon/Lat)	Location (TRSQ)	County
Department of Natural Resources & Conservation	Hydrology Station	-111.020416, 46.579082 (SRID: 4326)	03506E17BCE	GALLATIN

[View Gage List](#) | [Mapper](#)
[Entire Record Shown](#) [Show Last 7 Days](#)

Most Recent Automated Reading

Discharge: **18.92 cfs** at 2016-07-07 07:00:00Stage: **1.26 ft** at 2016-07-07 07:00:00Temperature: **NA deg C** at 2016-07-07 07:00:00

* New data is available every hour at 00:00.

Site Summary Min/Avg/Max

Month	Discharge (cfs)			Stage (ft)			Temp (C)		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
March	5.43	9.43	23.80	1.04	1.10	1.20	0.42	0.42	0.42
April	8.75	31.63	60.11	1.09	1.41	1.71			
May	31.71	51.20	73.31	1.43	1.63	1.82	7.53	7.53	7.53
June	19.72	31.97	45.98	1.27	1.42	1.58	14.57	14.57	14.57
July	13.31	18.64	37.24	1.21	1.26	1.48	8.87	10.58	12.29
August	5.70	11.26	20.03	1.14	1.19	1.28			
September	4.47	9.08	21.76	1.13	1.17	1.31			
October	0.00	9.29	21.76	1.14	1.17	1.31			
November	0.00	16.79	57.40	1.08	1.26	1.66			
December				-609.86	0.69	1.93			

* The data displayed above were compiled from the SWAMP database at the time this report was generated.

Other MBMG Data Center Resources

Ground Water Information Center (GWIC)

[81 record\(s\)](#) are available in the GWIC database.

- There are 5 static water level measurement(s).
- There are 1 water quality sample(s).
- There are 3 field visit record(s).
- There are 0 aquifer test record(s).

MBMG Publications Catalog

[350 record\(s\)](#) are available in the Publications catalog for GALLATIN county.

Mining Archives

[2 record\(s\)](#) are available in the Mining Archives database.

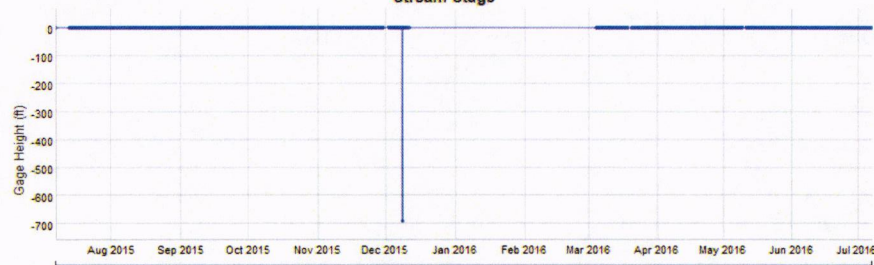
Discharge Graph

Stream Discharge



Stage Graph

Stream Stage



-111.020416, 45.579082 (SRID: 4326)

03S06E17BCB

GALLATIN

[Entire Record Shown](#) [Show Last 7 Days](#)

Discharge Graph

Stream Discharge



-111.020416, 45.579082 (SRID: 4326)

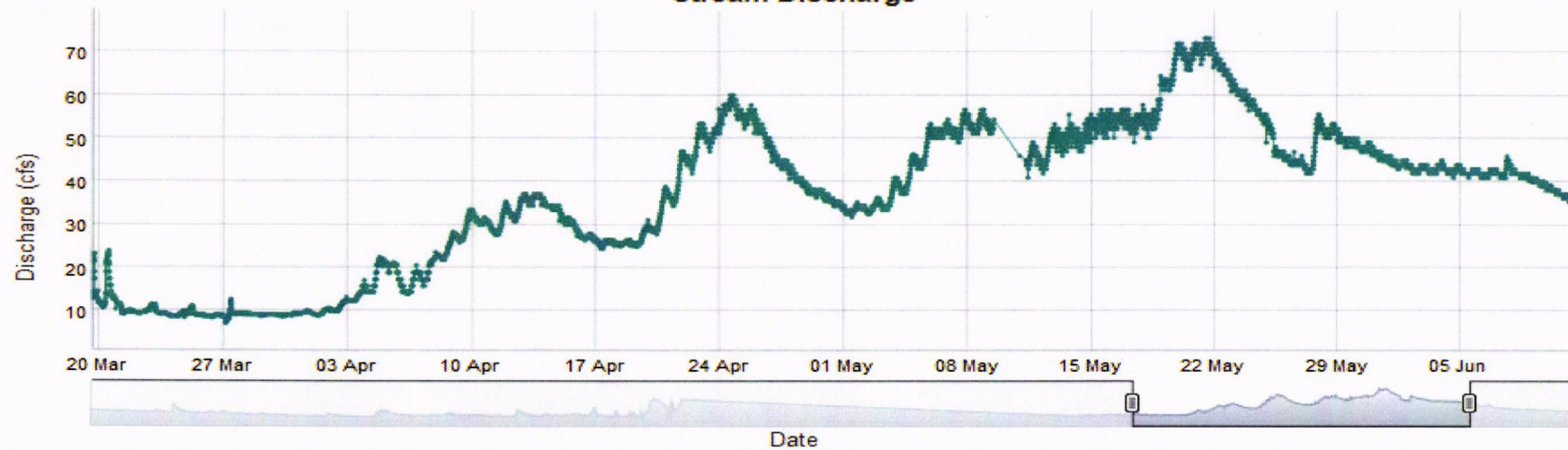
03S06E17BCB

GALLATIN

[Entire Record Shown](#) [Show Last 7 Days](#)

Discharge Graph

Stream Discharge



The following table summarizes the parameters collected during the field visit performed at this site on the date reported below.

GWIC Id	257351
Site Name	AXTELL SLOUGH AT AXTELL ANCENEY RD.
Site Type	STREAM
Lat/Lon	45.623897188, -111.207976209 (SUR-GPS, NAD83)
Location	02S 04E 34 AA
Ground Surface Altitude	4818.53 ft amsl

Drinking water limits are based on U.S. Environmental Protection Agency primary and secondary standards for public water : from U.S. Department of Agriculture Natural Resources Conservation Service water-quality guidelines. The guidelines are g on continuous irrigation.

Sample Id	GWIC Id	Sample Date	Site Name	Location	Site Type
2011Q1024	257351	4/11/2011 12:10:00 PM	AXTELL SLOUGH AT AXTELL ANCENEY RD	02S 04E 34 AA	STREAM

Constituent	This Sample	Drinking Water	Stock Water	Irrigation Water
Calcium (Ca)	46.200 mg/L	---	---	---
Magnesium (Mg)	12.500 mg/L	---	2,000 mg/L	---
Sodium (Na)	4.700 mg/L	250 mg/L [smcl]	2,000 mg/L	see SAR
Potassium (K)	2.630 mg/L	---	---	---
Iron (Fe)	<0.002 mg/L	0.3 mg/L [smcl]	---	---
Manganese (Mn)	0.003 mg/L	0.05 mg/L [smcl]	---	2.0 mg/L
Silica (SiO ₂)	14.700 mg/L	---	---	---
Bicarbonate (HCO ₃)	170.000 mg/L	---	---	---
Carbonate (CO ₃)	0.000 mg/L	---	---	---
Chloride (Cl)	2.500 mg/L	250 mg/L [smcl]	1,500 mg/L	---
Sulfate (SO ₄)	44.890 mg/L	250 mg/L [smcl]	1,500 mg/L	[b]
Nitrate (NO ₃ as N)	0.318 mg/L	10 mg/L [mcl]	100 mg/L	---
Fluoride (F)	0.225 mg/L	4 mg/L [mcl]	2 mg/L	---
Ortho-Phosphate (as P)	<0.1 mg/L	---	---	---
Aluminum (Al)	<2.0 ug/L	50-200 ug/L [smcl]	---	1,000 ug/L
Antimony (Sb)	<0.2 ug/L	6 ug/L [mcl]	---	---
Arsenic (As)	0.894 ug/L	10 ug/L [mcl]	50 ug/L	100 ug/L
Barium (Ba)	68.100 ug/L	2,000 ug/L [mcl]	---	---
Boron (B)	7.620 ug/L	---	---	---
Cadmium (Cd)	<0.2 ug/L	5 ug/L [mcl]	10 ug/L	5 ug/L
Chromium (Cr)	<0.2 ug/L	100 ug/L [mcl]	1,000 ug/L	100 ug/L
Cobalt (Co)	0.224 ug/L	---	1,000 ug/L	50 ug/L
Copper (Cu)	<0.5 ug/L	1,300 ug/L [mcl]	500 ug/L	200 ug/L
Lead (Pb)	<0.2 ug/L	15 ug/L [mcl]	50 ug/L	5,000 ug/L
Lithium (Li)	<2.0 ug/L	---	---	2,500 ug/L

[Return to menu](#)
[View the site summary for this site](#)
[View water quality for this site](#)

Data Dow

Graph

Stream Sta

2010 Jan 2011 Apr 20

Information Center | MBMG Data Center
 Mines and Geology
 the University of Montana
 - Natural Resources Building Room 329
 3997
 (406) 496-4343

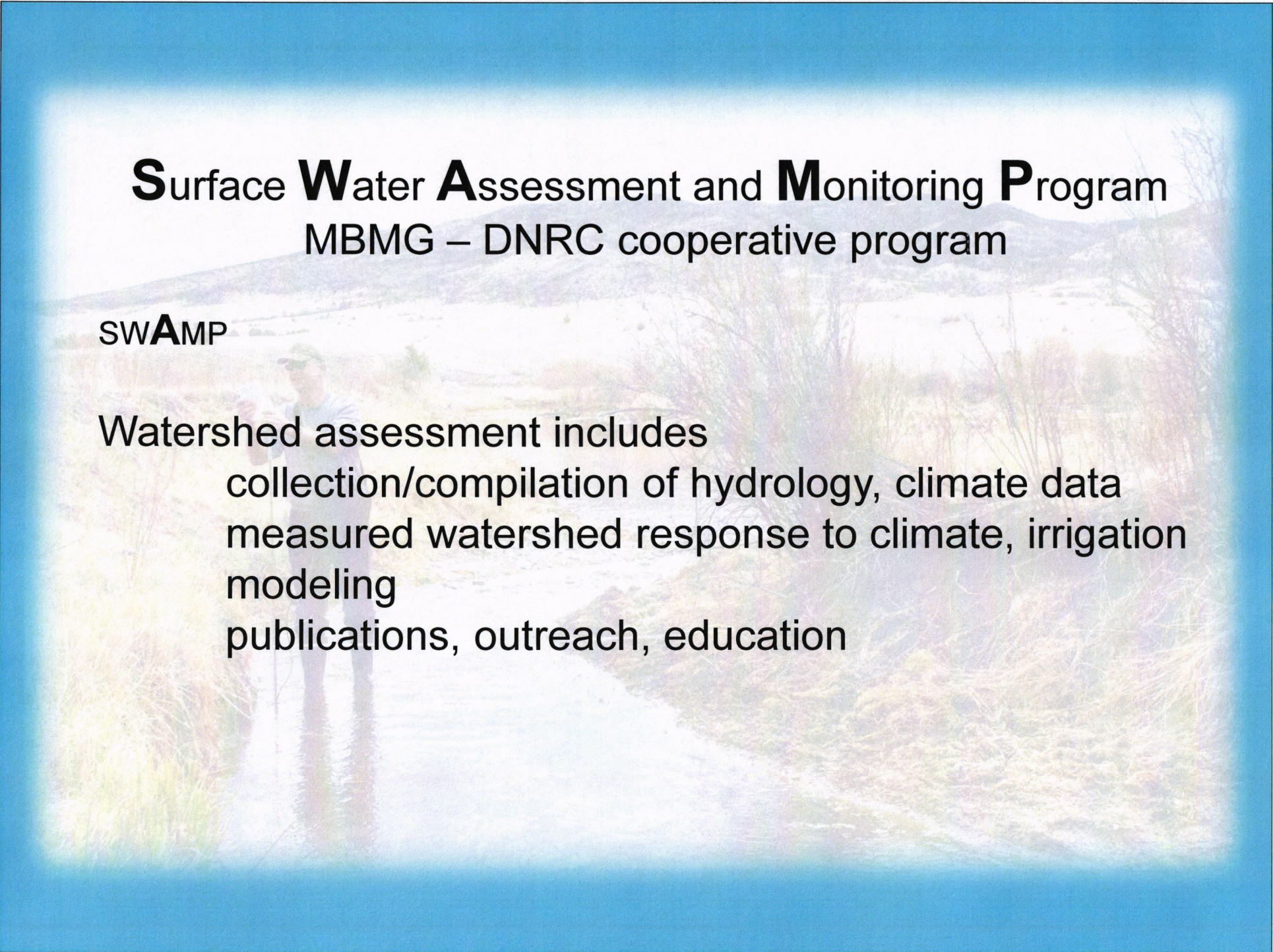
[Home](#) | [Well Data](#)

are currently available for the GWICId (257351) you selected. Standard water quality reports may contain cations, anions, trace s. Isotope reports contain any isotopic or radiologic elements. results.

Laboratory

IMG
 IMG
 IMG

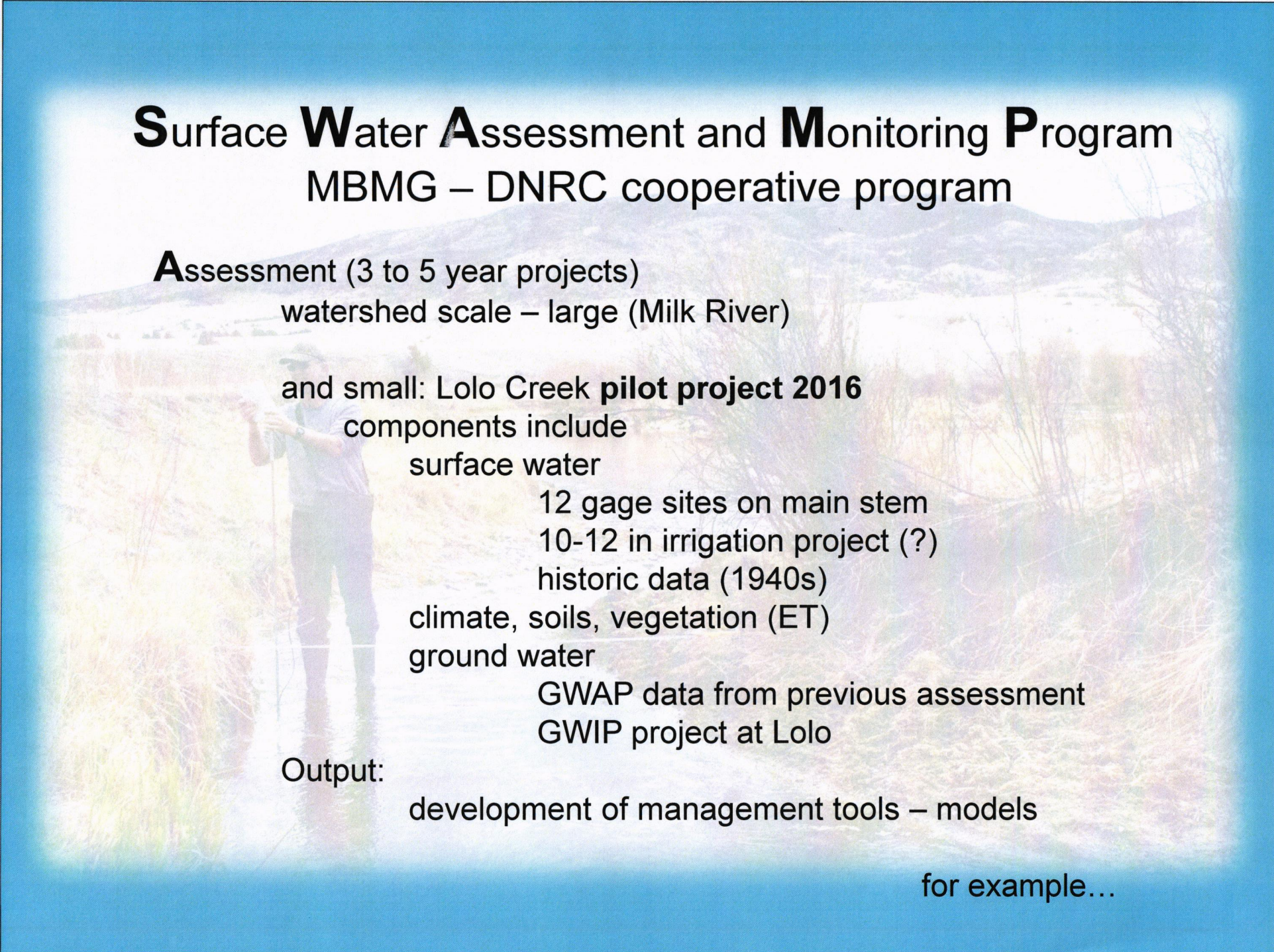
les to view.

The background of the slide is a photograph of a person wearing a cap and a light-colored shirt, standing in a field with tall grass and some bare trees. The person is holding a clipboard and looking towards the camera. The entire slide is framed by a blue border.

Surface **W**ater **A**ssessment and **M**onitoring **P**rogram MBMG – DNRC cooperative program

SW**A**MP

Watershed assessment includes
collection/compilation of hydrology, climate data
measured watershed response to climate, irrigation
modeling
publications, outreach, education



Surface **W**ater **A**ssessment and **M**onitoring **P**rogram

MBMG – DNRC cooperative program

Assessment (3 to 5 year projects)

watershed scale – large (Milk River)

and small: Lolo Creek **pilot project 2016**

components include

surface water

12 gage sites on main stem

10-12 in irrigation project (?)

historic data (1940s)

climate, soils, vegetation (ET)

ground water

GWAP data from previous assessment

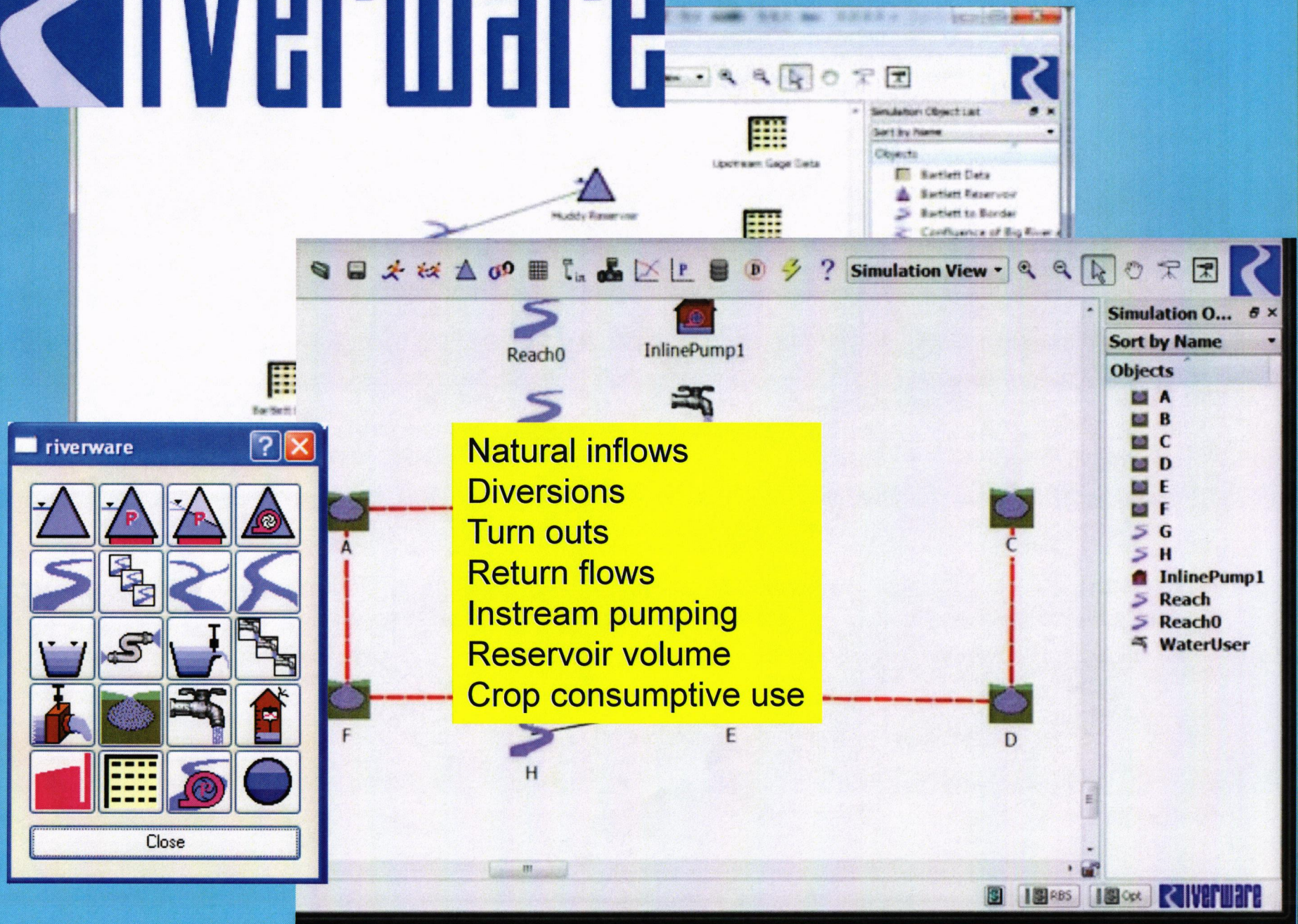
GWIP project at Lolo

Output:

development of management tools – models

for example...

RIVERware



Introduction Model Purpose

These pieces are described in detail in this document.

WATER ACCOUNTS

- Physical and paper
- There is a separate
- Accounts are linked
- Legal Accounts –
- Non Legal - Past
- Accounts are labeled
- Rules can access
- Can simulate water allocation, etc.
- A solver allows the date

In an accounting model, water is diverted. These additional flows through the basin. This model

Accounts

Storage Account	.....
Storage Account Slot Descriptions	.....
Storage Account User Method Categories	.....
Storage Account Solution Equations:	.....
Diversion Account	.....
Diversion Account Slot Descriptions	.....
Diversion Account User Method Categories	.....
Diversion Account Solution Equations	.....
Instream Flow Account	.....

Operational...

...planning...

...response

Properties of Accounts	.....
Water Type	.....
Water Owner	.....
Priority Date	.....

Supplies

Supply Names	.....
Types of Supplies	.....